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Foreign Agriculture

NEW FARMING METHODS IN THE ANCIENT LAND OF BURMA (SEE ARTICLE ON PAGE 70)

Foreign Agriculture

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FRONT COVER

Burmese Demonstration Plot

Burmese farmers join machine power and man power to plant potatoes in a demonstration plot. Purpose of the demonstration: to convince headmen of the Shan tribes that the innovations of planting crops in rows and on the contour will be to the advantage of their people. See story on page 70.

(Photo by Ross Madden, courtesy of the U. S. Information Agency.)

BACK COVER

Egyptian Wheat Supply

The United States has been Egypt's most important supplier of wheat since 1951-52, and in 1953-54 provided 95 percent of the wheat that Egypt imported. Egypt's total wheat imports were reduced in that year by a record crop.

NEWS NOTE

Pan American Day

Pan American Day 1955 marks the 65th anniversary of the Pan American movement and the 25th anniversary of the Day itself. Ever since its designation, April 14 has been a "commemorative symbol of the sovereignty of the American Nations and the voluntary union of all in one continental community."

Not the least manifestation of that "voluntary union" is the economic cooperation that exists between the United States and the Latin American Republics. Looking at trade figures alone, we can see its substance: Every year we sell those countries 15 percent of our agricultural exports—nearly ½ billion dollars' worth; and they in turn buy more than half our exports—more than 2¼ billion dollars' worth.

Credit for photos is given as follows: pp. 63, 66, Henry A. Jones; pp. 70-73, photos by Ross Madden (obtained through U. S. Information Agency); pp. 77, 78, Rhodesian Tobacco Association (obtained through S. M. McClintic, Economic Officer of the American Consulate General at Salisbury, Southern Rhodesia); pp. 81-83, D. R. Strobel and Claud L. Horn.

FOREIGN AGRICULTURE ALICE FRAY NELSON, EDITOR

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Egypt as a Market for U. S. Agricultural Commodities

by W. GARTH THORBURN

The United States has been Egypt's No. 1 source of agricultural commodities since 1950. In 1952, at the high point of Egypt's agricultural imports, we supplied 33 percent of their value. In 1953, though the total of such imports declined, the value of those we supplied increased somewhat, and our percentage of the total value jumped to 44. Wheat, wheat flour, and tobacco have been Egypt's chief imports from us.

Sufficiency of Domestic Production

One hard fact governs Egypt's agricultural situation: of its total area of 247 million acres, 97 percent is desert or otherwise unsuitable for agriculture. Most of its 22 million inhabitants live along the banks of the Nile and in the Nile Delta, on the land irrigated by the river; the population density there is as high as 1,800 persons per square mile. Each year the number of Egyptians increases by over half a million. In the past 50 years the population has doubled, while the arable area has expanded by only 12 percent. During the crop year 1953-54 this arable area totaled approximately 6 million acres, but multiple cropping brought the harvested area up to 9.4 million.

This severe limitation of the cultivable area means that Egypt must import grain. Imported wheat, wheat flour, and barley make up 15 percent of the Egyptian diet. Wheat alone—domestic and imported—furnishes on the average 25 percent of the calories that Egyptians consume, and corn another 31 percent. And despite recent increases in the production of both grains, the population has grown so fast that per capita intake of calories actually declined between 1948-52 and 1954. The Egyptian Government has been encouraging greater self-sufficiency in grain. But extensive increases in grain acreage could probably be made only at the expense of cotton, Egypt's main cash crop and also its main source of foreign exchange.

Under a 10-year economic development plan, Egypt is struggling to increase food production, improve the marketability of its goods, and develop and expand local industries and transportation. A vigorous program of reclamation wrested 100,000 acres from the desert in 1953. This land, together with that taken over from former landlords under the land reform program, is being reallocated to peasants according to their willingness and ability to cooperate with the Government in farming these new holdings. But reclamation cannot proceed much further without new irrigation facilities. Hence a major part of the 10-year program depends on the successful financing and construction of the proposed High Aswan dam, far up the Nile. Completion of this dam, now in final stages of planning, would permit 100,000 acres a year to be put under

Oxen furnish the draft power on most Egyptian farms. Farming methods are not so much responsible for Egypt's need to import food as is limited cropland.

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Production of major crops in Egypt, average 1935-39, annual 1952-54

[In thousands of short tons]

Crop	Average 1935-39	1952	1953	1954[1]
Wheat	1,373	1,230	1,704	1,978
Rice	499	380	480	601
Corn	1,778	1,660	2,044	2,205
Barley	257	132	132	146
Millet	470	575	639	566
Total, food grain	4,377	3,977	4,999	5,496
Pulses	456	372	331	346
Onions	257	220	334	395
Cotton	454	491	351	384

[1] Estimated.

cultivation over a 20-year period. Much of Egypt's desert area is potentially productive, lacking only water and the plant food that commercial fertilizer could supply.

On most of the land reclaimed in 1953, wheat and corn were planted. This increase in acreage was partly responsible for the largest crops of wheat and corn on record. In addition, the weather was unusually favorable, and the rise of the Nile provided an ample water supply under unusually good control. From domestic production in the 1953-54 crop year, 4,138,000 short tons of food grain were available for human consumption (after deductions for seed, feed, waste, and industrial uses). But despite this high outturn, Egypt still had to import 252,000 short tons of food grain, mostly wheat, to meet its requirements. And the happy combination of increased acreage and optimum growing conditions cannot recur every year.

Trade in Agricultural Commodities

Both Egypt's agricultural economy and its foreign trade are based largely on grain and cotton. It must import grain to supplement its own crops, and it must export cotton to finance its imports.

The United States accounted for 95 percent of the wheat and 67 percent of the wheat flour imported by Egypt in the crop year 1953-54, and has been Egypt's most important supplier of these products since 1951-52. But because of the record 1953-54 crop, Egypt's wheat stocks are now larger than usual (1,025,000 short tons as of November 1954); so its imports in 1954-55 are not expected to be larger than those in 1953-54. The 1954-55 wheat area, too, will probably be kept at the 1953-54 level by the existence of these stocks, as well as by the

Daily per capita consumption of calories and protein in Egypt, average 1948-52, and 1954

Commodity	Average 1948-52[1]		1954[2]	
	Calories	Protein	Calories	Protein
		Grams		Grams
Cereals	1,691	47.3	1,610	44.3
Starches	20	.4	13	.26
Sugar	148	—	142	—
Pulses and nuts	107	6.6	81	4.9
Vegetables	31	1.7	51	2.8
Fruits	72	1.0	80	1.1
Meats	48	4.1	36	3.0
Eggs	3	.2	3	.2
Fish	12	1.5	5	.7
Milk	139	5.9	86	3.6
Vegetable oil	82	—	87	—
Total	2,353	68.7	2,194	60.9

[1] Egyptian estimate.
[2] USDA estimate.

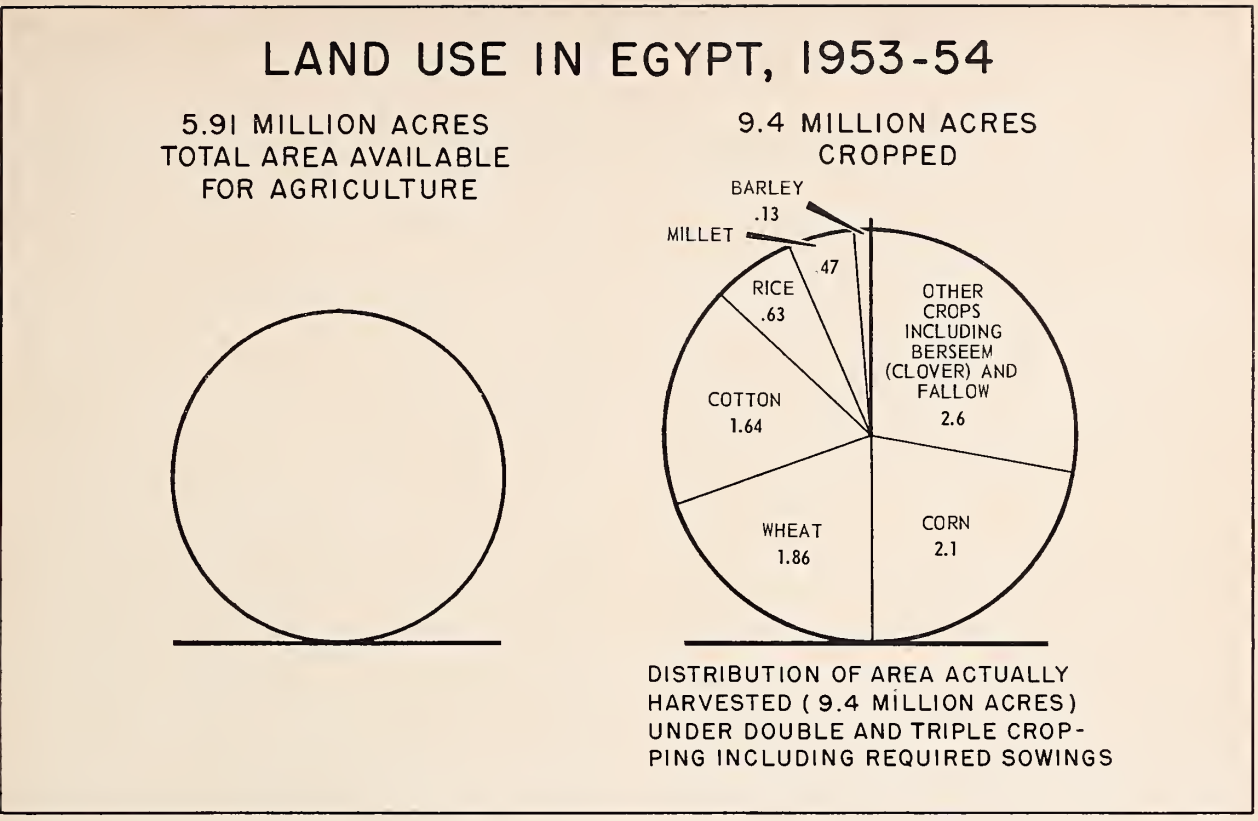
Egyptian imports of unmanufactured tobacco, by countries of origin, average 1946-50, annual 1951-53

[In thousands of pounds]

Country of origin	Average 1946-50	1951	1952	1953
Turkey	10,191	8,025	7,667	6,165
United States	3,667	3,944	4,199	4,999
Greece	1,901	3,942	3,064	3,081
India	2,048	2,170	2,177	2,173
China	580	1,005	984	904
Soviet Union	272	1,342	1,080	881
Union of South Africa	832	1,051	939	826
Other African countries	4,420	4,035	3,821	3,090
All other countries	3,009	2,396	1,930	2,122
Total	26,920	27,910	26,401	24,241

Government's decision that—for the first time since 1939—it will not fix a minimum wheat acreage. The expectation is that when the farmers are free to plant what they choose, they will choose to plant more cotton and less wheat.

Land use—and eventually trade—may also be affected by the lifting of the prohibition that Egypt has had in effect since 1890 on the planting of tobacco; in 2 or 3 years, the tobacco acreage could be sizable. Tobacco raising would give Egyptian farmers another cash crop besides cotton. And it would provide additional employment for Egypt's agricultural workers, who constitute about two-thirds of the labor force. For Egypt would probably grow the small-leaved Oriental tobaccos,



which require considerable labor at every stage of production.

Egypt's tobaccos would compete with those grown in Turkey and Greece, rather than with ours. Egypt has been importing increased amounts of United States type tobaccos: consumption of straight Virginia and blended types for cigarettes rose from 37.5 percent of total tobacco imports in 1951 to 42.2 percent in 1953. Of the unmanufactured tobacco Egypt imported from the United States in 1953, 75 percent was flue-cured and 24 percent burley. And in that year as compared with the 1946-50 average, tobacco imports from the United States were up 36 percent, though total tobacco imports were down 10 percent. At least part of the decline in total imports can be attributed to the fact that Turkey alone supplied 40 percent less tobacco to Egypt in 1953 than in 1946-50. If Egypt starts tobacco planting, it may eventually be able to supply much of the Oriental-type tobacco it consumes. It will, however, continue to be a market for U. S. flue-cured and burley.

Egypt also imports manufactured tobacco products, most of which in recent years have been English and American cigarettes. In 1950, of the 654,766 pounds imported, 432,102 consisted of English cigarettes and 191,800 of American. But since then, imports of manufactured tobacco products have declined steadily; in 1953 they amounted to only 338,954 pounds.

In 1952, Egypt's exports of cotton reached an 8-year high. But grain was short, and even the large return obtained from cotton sales that year had to be spent for necessary imports of agricultural and industrial products. If Egypt could produce more long-staple cotton in place of wheat, and could find favorable markets for the increased production, it could obtain enough foreign currency to supply all food deficits by importation, and in doing so raise its people's level of living. The Egyptians are reluctant, however, to commit themselves to large imports of wheat, for fear that cotton prices might drop or the utilization of long-staple cotton decrease so much that their cotton sales could not pay for their wheat purchases.

To supplement this one export crop, Egypt has in recent years been developing an onion trade that may have an important future. Egypt exports its onions both fresh and dehydrated, principally to England, the United States, and Switzerland.

Currently onions give the highest return per acre of any Egyptian crop.

Balance of Payments

Except for 1939, when exports slightly exceeded imports, Egypt has not enjoyed a favorable balance of payments since 1937. Holdings of foreign exchange have declined every year since 1945, when they were equivalent to $1,116 million; by September 1953 they fell to $180 million, though they are at present somewhat higher. It should be mentioned, of course, that the Egyptian pound was devalued during this period, so that substantially more Egyptian currency had to be spent to import goods of equal dollar value. True, in 1948-52 the average annual trade deficit was approximately offset by the annual income from the Suez Canal—about $75 million. But at the same time, net withdrawals of nonmonetary gold, investment income, and private capital together totaled almost as much as the deficit.

Outlook

It may well be that the pattern of land utilization over the next 20 years will differ substantially from that shown on the chart and reflected in the table below. If so, food grain deficits would be affected accordingly, especially if cotton acreage gives way to grain. Such a shift is unlikely, however, since it is reasonable to expect that Egypt's foreign market for cotton will expand along with world population and that over the 20-year period (other factors remaining constant) Egypt will increase its cotton acreage in proportion to the percentage of total crop area it devoted to cotton in 1954.

Estimated food grain deficits, 1954-75

Year	*Estimated population*[1]	*Food grain requirements*[2]	*Domestic food grain available for human consumption*[3]	*Food grain deficit*
		1,000 short tons	*1,000 short tons*	*1,000 short tons*
1954	22,205,000	4,390	4,138	252
1960	25,450,000	5,032	4,543	489
1965	28,516,000	5,638	4,894	744
1975	35,790,000	7,076	5,586	1,490

[1] Assuming an annual net increase of 2.3 percent.
[2] Calculated at 395 pounds per capita per year.
[3] Assuming the addition of 100,000 acres of irrigated land annually, with yield per acre and arable land use approximately the same as in 1954.

If Egypt should attempt to produce tobacco in quantity, the acreage for this use would of course have to be subtracted from that for all other uses. Although this would decrease the area available for food grains, it would not seriously alter the estimates presented in the table below.

On the basis of the assumptions underlying the table, Egypt will have continually increasing food grain deficits over the next 20 years. In 1960 they will approximate 489,000 short tons, rising to 744,000 by 1965 and to 1,490,000 by 1975. Egypt might find difficulty in marketing as much cotton as would become available from a cotton acreage expanded in keeping with a 33-percent addition to the arable land base. If so, no doubt it would devote some part of the new acreage to food grains, so as to cut down grain imports rather than pile up cotton surpluses. Possibly, also, even if Egypt determined to expand the cotton acreage, it could still reduce the food grain deficits by applying considerably larger amounts of fertilizer to the grain area. How far the deficits might diminish would depend on whether fertilizer could be made available at prices sufficiently attractive to farmers. However, no matter how the outlook is analyzed, it seems likely that during the next 20 years Egypt must import substantial quantities of food grain.

Floating pumping plant near Shandoweel, Egypt, rises each year with the Nile floods. When the river reaches its highest point, the intake pipe is attached at the topmost of the opening shown in the upright.

The International Cotton Advisory Committee

A practical approach to international understanding.

By A. W. PALMER

The International Cotton Advisory Committee counts itself among a half dozen public international organizations that within the last two decades have grown out of the common interest of nations in particular agricultural commodities.

Although these organizations differ much in their aims and the scope of their functions, the commodities with which they are concerned have one important element of similarity—they are all essentially international in character. That is to say, a substantial part of the world's production of each commodity must pass through the channels of international trade from the countries of its growth to the countries of consumption. Exports from one country have to meet the competition of exports of other countries in the markets of the world. Measures taken unilaterally by any one country to affect production, prices, or the flow of its trade in the commodity frequently clash with the interests of other countries in the commodity. Conversely, such measures are often frustrated or even nullified by countermeasures or by the reactions of producers in other countries.

Cotton is a prime example of an international commodity. The International Cotton Advisory Committee was established on this concept. It had its origin in the period of surpluses preceding World War II. From 1933 onward, as will be remembered, the United States had sought to restore the incomes of its cotton growers and repair the damage of the depression years by supporting the price of cotton to its producers. In the 1930's these supports generally were above the prices of competitive cottons in foreign markets. By 1938 it had become obvious that serious losses in American cotton export trade were resulting while, at the same time, under shelter of American price supporting loans, cotton production in other countries was mounting and the stock of cotton accumulating in the United States, then approaching 13 million bales, was becoming in effect the surplus of the world. U. S. exports of cotton, which had been of the order of 8½ million bales a year through the last half of the 1920's and over 7½ million in the early 1930's, had fallen to about 3½ million bales, while U. S. stocks were becoming larger than the year's crop.

Determined to redress the impossible situation, the United States set about to recover its customary share of world cotton export trade. To this end it applied, in August 1939, a moderate export subsidy (1½ cents a pound) calculated to lower the price of exported cotton to the world price level.

Announcement of this program met with formal protests from other producing countries and in some cases with threats of trade reprisals. Consultation of the interested governments was clearly needed; and, at the invitation of the United States, representatives of eight major cotton producing and exporting countries gathered in Washington for discussions in early September of that year. United States spokesmen made it clear that this country sought nothing more than to establish conditions that would enable it to hold competitively that share of the world market that its agriculture had been developed to supply and in fact had customarily supplied. This share before the period of price supports had been between 55 and 60 percent of total world exports. They declared that when the total of United States exports should attain its normal volume the subsidy would be discontinued, as in fact it was.

The International Cotton Meeting of 1939 sought a formula by which the divergent interests of the various cotton producing countries of the world could be accommodated through cooperation and

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a price war averted. If in the second aim it succeeded, in the first it was not altogether successful. The meeting had barely opened when World War II struck. Faced with new and alarming uncertainties on every hand, the meeting adjourned quickly, but not before agreeing to recommend to the governments represented that they establish a continuing international body through which its members might exchange information and confer on cotton economic problems of common concern. This recommendation was promptly accepted and so was the International Cotton Advisory Committee born.

For some time the life of the organization was at best a tenuous one. Lacking funds, it could afford neither quarters nor personnel, and for a year and a half the United States supplied both. Then, with the deepening crisis of the war, activities were suspended altogether for nearly 4 years.

The revival of the International Cotton Advisory Committee (ICAC) in 1945 was motivated by conditions similar in some respects to those that brought it into being in 1939. An excessive accumulation of cotton stocks in the United States had led to a new export subsidy (this time of 4 cents a pound) in November 1944. The reaction in the other producing countries was again immediate and vigorous. In April 1945 the United States Government invited the member governments of ICAC countries to send representatives to the fourth plenary meeting of the International Cotton Advisory Committee in Washington. Again the United States stated that its purpose was only to secure its appropriate share of the international trade in cotton and declared its willingness to negotiate a figure beyond which it would not subsidize its exports, provided governments of other producing countries would similarly agree.

The 1945 plenary meeting was of special importance for two recommendations agreed upon there. One was to open the doors of membership in the Committee to the governments of importing as well as of exporting countries. The other was to arrange a special Study Group drawn from three major exporting and three major importing countries to examine possible forms of cooperation that might in turn be recommended to governments as a basis on which to undertake the negotiation of an international agreement. In consequence, membership in the Committee was promptly increased and within 3 months the Study Group had begun its work. After a short time, however, differences of interest were disclosed that discouraged further effort. In these circumstances, the Study Group proposed that the organization of the International Cotton Advisory Committee be formalized, that the Committee be provided with a budget and a secretariat of its own, and that it be given the function of keeping developments in the world cotton situation under continuous review. Washington was suggested as the seat of the Committee.

The proposals of the special Study Group were received favorably by the International Cotton Advisory Committee in its fifth plenary meeting in 1946, recommended to member governments, and promptly accepted. A secretarial staff was thereupon recruited and, in January 1947, an Executive Committee was organized of Washington representatives of member governments. This was later to become the Standing Committee.

In December 1947, ICAC was recognized by the United States Government as a public international body and so designated by Executive Order.

Thus by a process of growth, conforming as much to the need for its benefits as to the design of its founders, ICAC has developed from a loose and formless association of governments, and has matured into a useful and accepted international body.

The Committee now includes in its membership some 32 governments of countries that account for more than 95 percent of the cotton production, consumption, and trade of the free world. Every major producing or importing country of the free world is a member.

As presently constituted, ICAC is principally a forum, where its members may come to present such of their cotton problems as have international implications, to question, and to explain. To enlighten the discussions, the Committee provides a worldwide and thoroughgoing service of economic intelligence in the field of cotton, including statistics, news of current developments, and analysis. Unlike the councils that in the case of some other commodities have been created to administer agreements, the International Cotton Advisory Committee is primarily a consultative body, normally without authority to take decisions limiting the action of any member. Authority so to act is possible only when the Committee is agreed within itself, and member governments by special action have individually concurred. Although ICAC is

strictly an intergovernmental organization, the practice of governments to counsel with the leaders of their private cotton producing, merchanting, and manufacturing groups and in fact to include representatives of these industry segments in their official delegations gives ICAC a central and unique position in the world's highly technical cotton affairs.

It is the Committee's rule to hold one plenary meeting a year, in which the officials responsible for the cotton policy and programs of their respective governments assemble and participate as delegates. Customarily, plenary meetings are held one year in an exporting country, the following year in an importing country, and the third year at the seat of the Committee in Washington. Thirteen such plenary meetings have now been held, the thirteenth having taken place at Sao Paulo, Brazil, in 1954. The fourteenth meeting, for which preparations are now being made, is scheduled for Paris in June of this year. In the intervals between plenary meetings the Standing Committee, convening in Washington, surveys the world cotton situation monthly, gives effect to the instructions of the plenary body, deals with questions of immediate importance, and in general lends to the organization's direction the necessary element of continuity. The Secretariat, responsible to the Standing Committee, is occupied primarily with the service of information and with the pertinent housekeeping functions.

To appraise in concrete terms the accomplishments of the International Cotton Advisory Committee over the 15 years of its life, or better perhaps over the 10 years of its activities since World War II, would not be a simple task. Prominent among its activities have been its efforts to further understanding among the various member countries of the problems of their production and consumption, and especially of their imports and exports of cotton, and to secure closer economic cooperation among governments. In these efforts it has had to deal with the difficult technical complexities of the commodity, as well as with the crosscurrents of interest of exporting and importing countries, with the proponents of free and unrestricted enterprise, and likewise with those who, believing some form of government support of agricultural prices to be a permanent part of governmental policy, would go a further step to protect their national programs by reconciling them with the programs of other nations. In a series of competent studies the Committee has explored the subject of international cooperation, pointing out the obstacles and the pitfalls no less than the means by which closer international cooperation might be achieved.

It is in the promotion of understanding among governments that the Committee has scored its greatest success. With the help of the Committee's information services, nations are enabled to see their own cotton situations in relation to the total world situation. By debate and discussion they are enabled to understand the purposes of other governments and the reasons motivating their policies and their actions. Gathering year after year in the plenary meetings of the Committee, responsible officials of the member governments establish acquaintanceships that become the basis for mutual respect and confidence. In consequence the relations of governments in matters affecting cotton have become more reasonable. Actions taken by national governments are more moderate. Protests are less frequent, and forbearance is more usual, with the result that world tensions are lessened. This accomplishment may prove to be of exceptional importance as the world once again faces an acute problem of surplus cotton while American producers find their production restricted to little more than the needs of American mills.

In some of its collateral activities, particularly in its information services, the Committee has enjoyed special success. Its publications are now generally accepted as authoritative. They circulate throughout the world and are widely quoted. The Committee constantly strives to better its information services and in some instances has stimulated governments to improve and expedite their own national statistical services, thus helping to clarify the world cotton picture.

Doubtless the best measure of the Committee's success is in the vigor and constancy with which member governments support it, the importance they attach to its meetings, and the earnestness with which they participate in the discussions.

What new accomplishments the Committee may record in the future will depend primarily on what member governments want it to accomplish. It may be confidently said that the organization has proved itself competent in respect of all demands that its members have so far made upon it. There is every reason to believe that it will do so in the future.

Ox carts and river boats are basic transportation in Burma. Lack of more efficient facilities for transporting goods is a limiting factor in the country's agricultural development.

Agricultural Development: Basic in Burma

By A. L. KNOBLAUCH

The Union of Burma has enough resources within itself to make it one of the substantial nations of modern times. Yet its resources are undeveloped; its agriculture, industry, and trade are far from modern; and its people are not well fed or prosperous. To change these circumstances and to give Burma the place it deserves, Burmese leaders are working on a plan to improve all aspects of their country's economy. Wisely they are beginning where they are; in other words, they are beginning with agriculture, which thus far dominates the economic scene.

Part of the program's aim, of course, is to correct the underindustrialization that hampers Burma's development. For Burma has many resources besides ample tillable land that call for development: it has labor, for instance; and it has oil, antimony, bismuth, lead and zinc, tungsten, silver, coal, and precious and semiprecious stones. But, so far, most of the country's industry consists of cottage industries, and much of its domestic trade is carried on by street vendors.

Considering Burma's many resources, Burmese leaders feel that their country's export commodities are too limited in number: they point out that in the 20-year period ending in 1950-51, rice, teak, cotton, and rubber were practically the only ones. At the same time, they say, a number of the imports were commodities that Burma should be able to produce for itself—milk, fish, meat, sugar, groundnut oil, leather piece goods, bags, rubber products, and mineral oil. For Burma already has a considerable diversity of crops—silk, rice, groundnuts,

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In the course of his stay in Burma as a Fulbright Professor, the author did much traveling through the country. Some of his observations are presented here.

pulses, sesamum, millet, maize, cotton, tobacco, sugarcane, rubber, vegetables, fish, and lumber—and could produce others. What it lacks is adequate productivity per worker and per acre, plus a reasonable level of industrialization.

With all its resources, Burma could be wealthy. Yet, despite its progress to date, its per capita income is only about $55 a year; its infant mortality is high; the average diet of its people is fairly low in calories; and the average life span is short.

The Burmese agree that low agricultural productivity is one of the basic reasons for these conditions. Low rice yields, for instance, place Burma close to the bottom in a list of rice-growing countries arranged in the order of their annual yields of rice paddy in 1952-53:

	Pounds per acre		*Pounds per acre*
Italy	4,719	China	2,230
Spain	4,560	Indonesia	1,471
Japan	3,464	Burma	1,301
Egypt	2,861	Pakistan	1,191
South Korea	2,807	Thailand	1,152
United States	2,468	India	1,047

Basically, Burma's agricultural needs may be spelled out as follows: (1) Methods and equipment,

Demonstration to a group of farmers to emphasize the need for keeping grass and other plants on the soil. Such lessons are important to tribesmen who have made it a practice to burn the grass every year, use the land until it was exhausted, and then abandon the denuded area to erosive elements.

(2) seeds and fertilizer, (3) irrigation, (4) development of its livestock industry, and (5) education.

Better methods and equipment are needed for practically all the agricultural processes, from tillage to harvest. The modern wheel and tread types of tractors could do much to facilitate agricultural production in Burma, but not many are in use. In fact, during the 9 months I spent in that country and Thailand, I saw only a few. A considerable number of the machines are reported to have been purchased in the last few years for use in selected suitable areas.

Burmese woman hand-dyes a skein of silk, in preparation for weaving it into cloth.

At a hand loom a Burmese weaver creates a fabric.

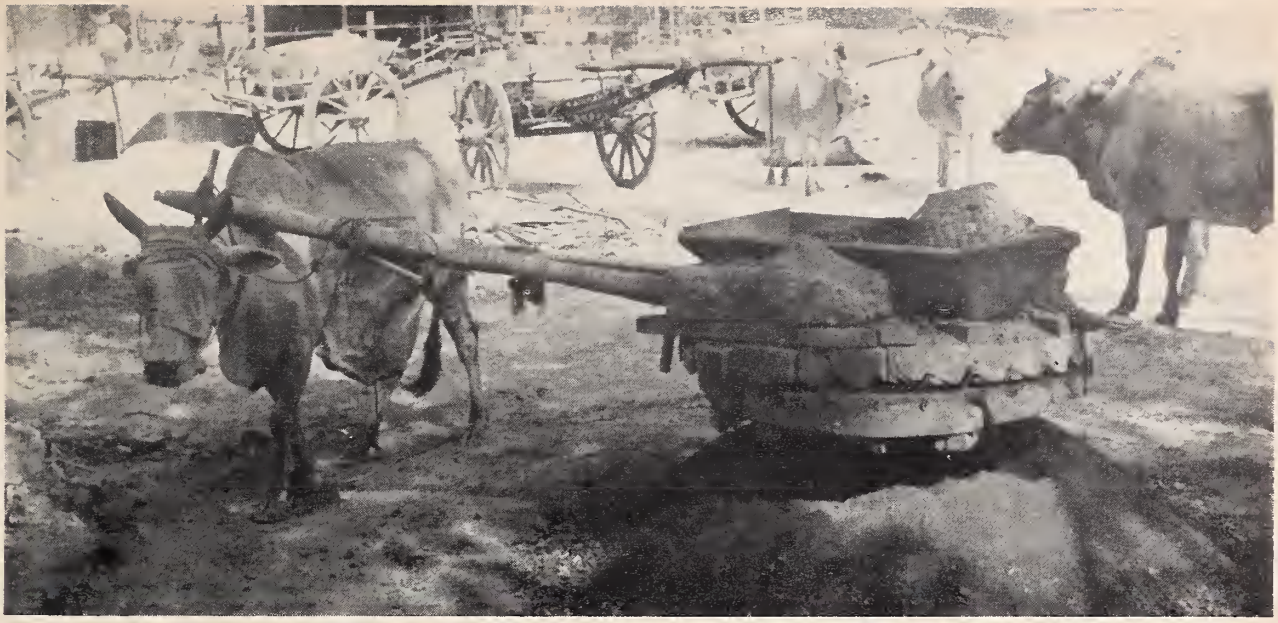
Modern harvesting equipment is almost as necessary as an efficient plowing device, yet rice in Burma is usually threshed by primitive methods. Of course exceptions exist, but they do not describe conditions in Burma and most other parts of the Far East. South of Bangkok I saw one of the early hand-operated grain separators; and it occurred to me that such a machine would be of considerable value to the average Burmese paddy worker.

Much of the rice grown in Burma comes from seed that has seen little improvement in recent centuries. Milling specifications permit a large amount of breakage (40 percent), and such quality standards tend to confine Burmese exports to countries that will accept such a product. Even where improved seed is planted, it is usually mixed with inferior seed, with the result of leveling down the product. Burmese agriculturists deplore the fact that not enough improved seed is currently available; but they estimate that even the available supply, if properly used, could increase rice production by as much as 5 to 10 percent.

Failure to use fertilizer is another factor that Burmese leaders mention in the low agricultural production. During 1936-40 Burma, which used little if any fertilizer, produced approximately 850 pounds of rice per acre while Japan, which used considerable fertilizer, produced 2,420 pounds.

The problems of irrigation also are prevalent, and the possibilities are unlimited. Approximately 1,348,000 acres, or less than 10 percent of all cultivated land in Burma, are under irrigation. In a monsoon country, such limited irrigation means heavy crop failures. In short, according to the country's leaders, Burma can help ensure its agricultural production if it can control more effectively its water supply. Fortunately the problem of irrigation is being attacked all over the Far East, particularly in India and Burma.

Burma's need for livestock development also is a matter for concern among Burma's farm leaders. In 1948-49, in a land of approximately 20 million people, there were 1,221,000 cows, 442,000 pigs, and 24,000 sheep; there were also 1,902,000 bullocks and several thousand horses, ponies, donkeys, mules,



Water buffaloes and cattle provide motive power to mill lime for fertilizer in a Mandalay yard. Burmese cattle owners generally use their animals for power alone.

and water buffaloes. Most of these are said to be on the decline in numbers if not in quality. The raising of a satisfactory livestock crop cannot be an incidental enterprise, a fact that the Burmese recognize; and the government is currently making efforts to improve breeds and to arrest the decline in livestock numbers.

In a country where fewer than 40 percent of the people are literate, education becomes of paramount importance. The overall national effort to produce a literate populace has been tremendous. Usually general education precedes special education, but in Burma both efforts are progressing simultaneously—a fact that holds great promise for agriculture. I saw educational projects aided by the Foreign Operations Administration. I witnessed the growth of a new concept of agricultural extension education. In cooperation with Dr. William K. Gamble of Shenandoah, Iowa, I saw efforts to develop agricultural education programs and to train teachers for those programs in the secondary schools. On one occasion I visited the agricultural experiment station, or farm, at Mudon, and was impressed by the work being done there.

Undeveloped as it is, agriculture is the preoccupation of most Burmese workers. Seventy percent of the labor force, compared to only 12.2 percent in the United States, is engaged in agricultural pursuits. Considering the industrial potentialities of the country, this distribution of labor means an imbalance between the national agricultural effort and the industrial and trade effort. The result is an economy that leaves the people short of even the essentials of modern living. All available data seem to support the conclusion that Burma will not be fully effective on either the national or the international levels until it can develop its agricultural and industrial potentials and arrange for a better balance in the use of its labor force.

Burma's modern leaders recognize the necessity for such a balancing of the economy and are making efforts to accomplish it, though they face odds that are almost overwhelming in number and intensity. Under their leadership one of the first steps in this direction is making agricultural effort more productive. Certainly a greater efficiency in agriculture should release from the farms the labor force that Burma will need for whatever program of industrialization it undertakes.

Burma suffers from a lack of communication facilities that makes it difficult to collect dependable data on many phases of the national economy. Despite this handicap, however, the Directorate of Labor is currently collecting, at regular periods, data on employment in a number of areas. It began these efforts in the early 1950's and will improve and supplement them as time goes on; in 1951, for example, its study supplied additional information

on the utilization of the country's labor force: a summary of the findings of 699 firms reporting on the distribution of their 42,773 permanent workers and 48,031 temporary workers. In addition, to supplement the work of the Directorate, Burma is supporting an extensive economic and engineering survey under the auspices of the Burma Economic Council.

An economic development program, too, has been inaugurated. The Anti-Fascist Peoples Freedom League party, which is now in charge of the government, outlined a 10-point program at the party caucus in August 1952; and that program was subsequently adopted by the National Parliament.

Burmese leaders have described this program as one designed to produce an enlightened welfare state—and they mean "welfare" not in the relief sense, but in the general sense. Although the program is comprehensive and touches upon almost all areas of economic life, at least half of its goals affect agriculture, either directly or indirectly:

Agricultural and rural uplift.
Democratization of local government bodies.
Decentralization of government.
Development of backward areas.
Economic development projects.
Education.
Land utilization.
Public health.
Rehabilitation.
Transportation and communication.

When Burma has had an opportunity to carry out its many-pronged national program, it will be able to take a more positive place in world trade. The United States can be of assistance to Burma in solving the problems outlined in this brief report. Solutions need not be in conflict with the advocates of "trade, not aid," and they will afford the maximum assurance that Burma will remain friendly to the democracies of the world.

Iraq's Oil Earnings To Aid Agriculture

The Iraqi Government has announced that it is planning to plow back most of its earnings from oil in the next 5 years through half a dozen broad projects that hold much promise for the country's agriculture. The money will go for irrigation and drainage, water wells, experiment stations and laboratories, transportation, a sugar factory, and new farms for landless farmers.

In Iraq, oil is a Government monopoly. Production has risen from less than 6 million tons in 1950 to a current 30 million, and will this year contribute some $165 million to the nation's treasury. Charged with the responsibility for investing 70 percent of the income from oil, the Development Board will shortly ask legislative approval for a program calling for the expenditure of $840 million by 1960.

Of the total sum, over $360 million will be set aside for irrigation and drainage projects, which are expected to open 650,000 acres of new farming land in the upper basins and valleys of the Tigris and Euphrates Rivers. For reclaiming the more arid sections, where nomadic tribes may be profitably resettled as cultivators, over $10 million is to be used for drilling several hundred water wells. The expense of establishing landless farmers on state-owned tracts all over the country, on a smallholding basis, will be met under the plan. And a fund for opening new experiment stations and laboratories to aid in improving livestock and modernizing farm practices is an additional $17 million item in the budget.

Marketing of crops will be facilitated by the building of roads and bridges and the extension of Iraq's railway lines at a total estimated cost of nearly $180 million. The country's traditional reliance on imports for sugar should be reduced somewhat by a sugar manufacturing plant, which will use local sugar beets; the plant will be financed with part of the $140 million earmarked for new industries.

Of secondary benefit to agriculture will be mineral surveys, a countrywide electrification scheme, and large-scale plans for low-cost housing, to which are allocated the remainder of the total proposed for expenditure.

—Henrietta Holm
of FAS's Asia and Middle East Analysis Branch.

The United States' biggest competitor in world markets for flue-cured tobacco is Southern Rhodesia. In this article a leader in tobacco research of that country tells what is being done there to get more tobacco out of each acre.

Tobacco Farmers in Southern Rhodesia Profit by Research

By F. A. STINSON

Tobacco growers in Southern Rhodesia no longer are depending on acreage increases to give them larger crops. Instead they are looking to ways of increasing yields per acre: they are taking advantage of what their own researchers are finding out about such things as when to plant, how to fertilize, what rotation to use, and how to control disease. And they are working to improve the quality of their product.

When the tobacco-raising industry began in Southern Rhodesia, in the early 1900's, labor and land were abundant and cheap; and every time the growers wanted to increase production to meet growing market demands, they just hired more labor and cleared and planted more land.

But the method let them down in 1951 and 1952. Yields per acre fell from 600 to 500 pounds; and, although the growers made substantial increases in acreages, they failed to raise total production above the 1950 total. Ever since, however, history has been reversing itself: each year the farmers have reduced their acreage, but at the same time they have managed to produce record crops—105 million pounds in 1953 and 120 million in 1954. Average yield per acre in 1954 was nearly 700 pounds.

This evidence that Rhodesian farmers are becoming more efficient producers reflects the research work that is going on in Southern Rhodesia under the Tobacco Research Board. This Board was set up in 1950 specifically to provide the industry with scientific information on which to base sound production methods. Growers pay two-thirds of its cost; the Government pays the rest.

Creation of the Board is itself a sign of the stature that flue-cured tobacco has achieved in the Rhodesian economy in recent years. Production has increased fourfold since 1944. In the past decade tobacco leaf has brought in greater returns than any other commodity and has accounted for more than one-third of the country's exports. Such an increase in importance is of course attended by an increase in complications. Land suitable for tobacco, though virtually unlimited in supply, is priced five to six times higher than it was in 1944, and labor costs have more than trebled. Meanwhile, increasing market competition is placing greater emphasis on quality and efficiency.

Under the direction of the Board, several research stations have been seeking the causes for low yields. Judging by their findings, the failure of production to keep pace with acreage expansion in 1951 and 1952 is not explainable solely by unfavorable weather. The fact is that production facilities were overtaxed. Farmers were planting more acres than they could effectively care for. The shortage of curing barns, for example, made an obvious bottleneck: millions of pounds of mature leaf were lost for this reason alone. Now, thanks to the Board, growers are taking a more realistic measure of the number of acres they can manage. In 1952 the average per grower was 75 acres; in 1954 it was 66. Besides, they have built more curing barns.

By 1953 the Board had carried out enough experiments to warrant its offering suggestions for improving cultural methods.

One of the most important of these suggestions is based on the effect of rainfall. In Rhodesia temperatures are right for tobacco from mid-September to mid-April; but rainfall is not likely to be right until November. More than 90 percent of the rain falls during the five months from November through March; another 8 percent may fall

Dr. Stinson is Director, Tobacco Research Board of Southern Rhodesia.

just before and just after the period, i.e., during October and April. The research stations have found that the best crops are produced on a total of 14 inches suitably distributed; appreciable variations from this amount affect both yield and quality adversely. Most desirable distribution, tests showed, consists of low rainfall during the first week or two after transplanting; moderately light rain, interspersed with periods of sunshine, during the next month or 6 weeks; and more abundant rain as the crop approaches maturity. Such distribution can be had normally only when seedlings are transplanted as early in October or November as soil moisture permits. For each day that transplanting is delayed after the first rains of the season, yield can be expected to drop 15 pounds per acre.

In this connection, too, Rhodesian research stations in 1952 demonstrated for the first time the advantage of using a little water to set each plant. Up to then, growers had had to transplant either during a rain or immediately after it; and if, as so often happened, the first rains of the season were isolated showers, many seedlings were likely to die of drought before the next rain came along. These casualties left gaps in the rows that either went unfilled or were filled only after serious delay. To avoid these inconveniences and hazards of early planting, farmers were inclined to postpone planting until more frequent rains could be expected, sometimes planting as late as January. But now the practice of setting with water, which results in complete, even stands despite early lapses in rainfall, has been widely adopted and early planting is becoming the rule.

Another advantage besides good rainfall distribution has been found to accrue to the tobacco that is planted early: relative freedom from nematodes, other insects, and disease organisms. Numbers of all these pests are reduced during the rain-free months. Nematodes, for instance, are not present in the topsoil until after the first rains and then require 2 months in the moist soil to build up their numbers. Tobacco planted with the first rains therefore has several weeks of relative freedom from attack and, even in heavily infested soils, can yield good crops. For white grubs and cutworms, too, a considerable lag occurs between the first rains and the peak of predatory activity. Diseases transmitted by aphids and whiteflies, as well as the prevalent leaf-spot disease known as frog-eye, also are lighter in tobacco transplanted early.

As farmers have come to recognize the advantages of early planting, they have also grown interested in overhead irrigation, which would permit them to transplant even before the rains start. The Government has been subsidizing the building of dams for some years, and enough water has been impounded on many tobacco farms to provide supplemental irrigation for a considerable acreage. The irrigation requirements of tobacco plants at different dates have been investigated, and it has been found that relatively little irrigation is needed for the young plants before the rains start.

The soils of Southern Rhodesia, most of which are granitic sands and sandy loams with low fertility, excessive drainage, and good aeration, need considerable quantities of commercial fertilizer if they are to produce good crops of tobacco.

Until recently, fertilizer practices varied widely from one farm to another. It was customary to measure out the fertilizer for each plant with a tiny cup, but the size of the cup varied. Fertilizer-selling agencies supplied the cups in assorted sizes to give rates of 50, 100, and 200 pounds per acre.

Statistics of fertilizer sales indicate that the 1952 crop received only about one-third of the recommended minimum for both phosphate and potash. The amount of nitrogen used fluctuated from crop to crop, depending on the season. The need for nutrients other than nitrogen, phosphate, and potash was not taken into account.

There was also considerable difference in the time of application. Most farmers applied some fertilizer at transplanting time, mixing a cupful into the soil where each plant was to be set; and then they supplied another cupful 3 or 4 weeks later. Some growers did not fertilize until the plants had become established, and some gave 3 or 4 top dressings up to the sixth or seventh week of growth. Top dressings containing a high percent of nitrogen were frequently applied during prolonged rainy spells, when tobacco turned pale.

In the last few seasons, however, many studies have been made of the effect of various fertilizer practices; and farmers are learning which are best.

Field experiments have shown substantial benefits from increasing the size of the applications. For example, by increasing the amount of phosphate from 40 pounds per acre to 120 pounds and the amount of potash from 30 pounds to 90 pounds, yields have given a return of nearly 9 to 1 on the cost of the extra fertilizer. Efficient use of one of

these nutrients, however, appears to depend on the presence of an adequate supply of the other. When phosphate was omitted, for example, or when it was placed in such a way that the roots of young seedlings did not reach it, researchers observed a marked delay in the development of the tobacco.

Besides, advantages have been demonstrated for making a single application of fertilizer in bands at each side of a row, either shortly before or during the transplanting. This practice makes stands more uniform and accelerates early growth, thus contributing to higher quality and yield.

It has been found also that top dressings with nitrogen any later than 3 weeks after transplanting are justified only in exceptional cases for late crops: not only do they impair leaf quality but, by delaying maturity, also increase the risk of loss from certain leaf diseases, such as white mold and Alternaria. Research has shown that the amount of nitrogen needed to produce optimum returns in Southern Rhodesia varies greatly, depending on such factors as soil type, time of plowing, and the system of cropping. More than 10 or 12 pounds of nitrogen would lower the leaf quality if applied on a sandy loam after plowing in a heavy crop of, say, immature munga (pearl millet); whereas from 3 to 4 times that amount would be needed on some virgin land after a crop of mature grass had been plowed in.

As for other nutrients: Boron, added at the rate of 2 to 3 pounds per acre, has given consistent increases in crop returns; and magnesia, at 20 pounds per acre, has corrected some of the serious shortages of magnesium that have been observed from time to time.

As new information is obtained on fertilizer practices for flue-cured tobacco, local fertilizer manufacturers and suppliers are adjusting their mixtures. Before 1952 the chief mixture was 6-10-8; but in 1953 two new mixtures—4-18-15 and 2-8-15—were supplied. In 1954 the 6-10-8 was replaced by a 6-18-12. All of the fertilizers made for use on the 1954-55 crop contain boron.

Farmers have accepted suggestions about fertilizer practices with alacrity. For example, the advantages of using at least 100 pounds of phosphate per acre and 90 pounds of potash were first pointed out in 1953. So prompt was the growers' response that by 1954 the average use of phosphate in the country had risen to 61 pounds and the use of potash, to 64 pounds—substantial increases over the 1952 averages, which were only 36 pounds and 26 pounds, respectively.

Another phase of tobacco culture that has come

Two men on a tractor-drawn planter set out tobacco seedlings in experimental plots at Kutsaga, headquarters of the Tobacco Research Board of Southern Rhodesia. The planter waters each plant and applies fertilizer in a double band on both sides of the row.

Oil emulsion is applied to a topped tobacco plant. This method of controlling suckers has obtained good results at the tobacco research stations in Southern Rhodesia.

in for scrutiny by the Tobacco Research Board is the various systems of cropping that have been followed throughout the country. Several field experiments to examine and compare these systems were started in 1951, and new experiments have since been added to cover various lengths of rotation and methods of management.

One of the commonest cropping systems under observation was one in which newly cleared land was first planted to 2 consecutive crops of tobacco and then to 1 crop of corn, and then let go to grass for 6 or 7 years, after which the cycle was begun once more. Now, less wasteful systems of cropping are being adopted: annual green crops and several excellent pasture grasses are being used on an increasing scale to restore soil productivity. The various studies under way on the subject are bent on devising a system that is reliable from several standpoints: it should regularly replenish the soil with organic matter through the return of suitable crop residues; it should avoid losses from nematodes; and it should have a rotation period short enough to permit an economical proportion of the total area to be always in tobacco.

Closely related to the crop rotation for tobacco is the method of tillage used in preparation for planting. Results of experiments indicate that, unless plowing is done early enough to permit the turned-under vegetation to rot before the dry season begins, the next tobacco crop will be poor. Annual cover crops should be turned under before they reach maturity. In general, the deeper the plowing, the better the tobacco crop; and, if subsoiling is done along the bottom of the furrow while the soil is still dry, the crop will be better still. Plowing to a depth of 9 inches is recommended; subsoiling, to a depth of 20. Subsoiling results in greater root penetration, which is especially desirable in hot, dry weather.

Methods of performing such routine operations as topping, suckering, and curing also have been adjusted and generally improved to make them more suitable to the type of tobacco now grown. Under conditions in Southern Rhodesia, the use of oil emulsions for controlling suckers appears to be free from the disadvantages experienced elsewhere in the world; and, for the first time, oil suckering is being recommended for use on the present crop.

The leaf at the right owes its better length and quality to the practice of low topping, which is now being adopted by Rhodesian farmers.

Some of the problems that growers encounter in curing their leaf are peculiar to Rhodesian conditions. Because moisture is absorbed by the bare brick walls of curing barns, the coloring process is slowed down and leaf quality is lowered. And the combination of low temperature and high humidity that prevails in the average barn during the coloring process has been found to favor the development of barn spot—a disease that greatly reduces the value of cured leaf. The former problem may be overcome by plastering and moisture-proofing the inside of the barns; the latter, by distributing steam throughout the bottom of the barn to provide heat (about 100° F.) and moisture during the first 16 to 20 hours of coloring. Such high heat in a saturated atmosphere prevents the growth of the fungus and virtually eliminates the disease. Steam boilers are available on nearly all farms and many growers are using them for this purpose. The procedure also speeds up coloring and improves the cure, provided there are enough ventilators to get rid of the moisture when it is no longer needed.

All the varieties of flue-cured tobacco now being grown in Southern Rhodesia, though differing from one another in certain respects, are capable of producing high yields of excellent leaf. Selection and testing are in progress, of course, to maintain and improve the present varieties, but major emphasis is on introducing resistance to disease. Researchers are using breeding material that has been found resistant to white mold, anthracnose, and mosaic.

The old methods of producing seedlings have offered exceptional opportunities for improvement. Growers formerly thought that seedlings more than 8 or 9 weeks old should not be transplanted, and therefore they seeded a few beds every 10 days for 3 months in order to have seedlings of transplantable size whenever rain made it possible to transplant. For every acre to be planted they considered they had to have at least 30 square yards of seedbed; and every season they selected a new seedbed site and burnt a deep layer of brushwood on it to destroy weed seeds.

Now, however, with growers less dependent on rainfall for their choice of planting time, a larger proportion of the seedlings can be used. Besides, it has been demonstrated that the age of a seedling is of minor importance. Some growers, by clipping the seedlings with hedge shears to let light into the beds, keep them from growing too long and so are able to use nearly every plant. Thus, with the size of the seedbeds reduced, farmers are beginning to sterilize their seedbeds with chemicals instead of with burning brushwood—a change that has both efficiency and economy in its favor. By planting green-manure crops in the seedbeds as soon as the seedlings are gone, the grower can improve and use the same site year after year. Recent findings also indicate that the purpose of the grass or cotton used to cover the beds is to shade the soil rather than the seedlings. Excellent seedlings are being grown in beds covered with a light grass mulch, through which seedlings grow up; with such a cooling and moisture-preserving layer on the soil, the seedlings themselves seem to require no shade.

Much of the experimental work undertaken in Southern Rhodesia in recent years has been *ad hoc:* a considerable portion of it has been planned to adapt known methods to local conditions. During this stage of development, the major effort has been expended on investigations designed to give practicable solutions for outstanding problems and thus help growers to halt the rise of production costs. Special emphasis has been given to present the results of experiments in readable and attractive form. There is ample evidence that the factual information thus provided is being applied extensively in the improvement of Rhodesia's tobacco.

Remarks on Our Interest in Trade

by Secretary of Agriculture Ezra Taft Benson

The prosperity of the United States has been built largely upon specialization. We have progressed far from Colonial days, when each American family had to produce its own needs. Today practically every person is a specialist, producing only a few goods or services, and buying all the other things he needs. The modern farmer is a specialist. He is, you might say, a manufacturer. He combines his land; personal, family and hired labor; capital; seed; fertilizer; etc.; and produces products for the market. He uses increasing amounts of machinery and other capital, and he concentrates

(Continued on page 80)

Our Interest in Trade

(Continued from page 79)

his efforts on a few commodities that are suited to his particular farm. This has led to specialized areas; cotton and tobacco in the Southeast, corn and hogs in the Midwest, and so on.

Clearly this specialization would have been impossible without trade. We have been able to specialize because the producer could find markets for his goods. Within our borders, we have fostered the development of trade among the 48 States. The United States is the largest single area in the world within which trade is relatively unrestricted.

As a Nation we have gained from trade with other nations. We have gained by importing some goods that could be produced more economically abroad. And we need foreign markets for many American goods, including the products of American farmers.

American agriculture has a vital interest in foreign trade and in policy affecting that trade. In recent years the production of 30 to 50 million acres of our cropland has gone to foreign consumers. The prosperity of our agricultural economy is significantly affected by this important foreign market. At the present time approximately 10 percent of our agricultural income is derived from exports. On a value basis, our farm exports totaled almost $2.4 billion during the months of January through October 1954. Thus we can conservatively estimate that these exports for the full calendar year 1954 will approximate $3 billion.

While all producers of farm commodities gain from foreign marketings, producers of some commodities depend more heavily on exports. United States exports in the most recent marketing year, 1953-54, accounted for 45 percent of our rice crop, 26 percent of the tobacco crop, 24 percent of the cotton crop, 21 percent of the soybean crop, almost 19 percent of the wheat crop and 18 percent of the lard production. Other commodities for which a sizable share of production is exported are: inedible tallow and greases, 45 percent; grain sorghums, 14 percent; and dried prunes, 19 percent. Exporting these large shares of farm production helps to minimize the difficulties that result from burdensome surpluses and acreage cutbacks.

To have a prosperous agriculture in the United States we also must have industry prospering and expanding. Increased exports of industrial products in recent years have strengthened America's industrial economy considerably. This has been beneficial to the American farmers because it has assured laborers in industry good wages. These earnings have been used to maintain high levels of consumption of such farm products as beef, fruits and vegetables, as well as many others.

United States foreign trade, like our domestic trade, permits a more economical use of our resources by promoting specialization of production. Taking the economy as a whole, we enjoy higher real wage levels and living standards with foreign trade than would be possible if we relied solely on supplies and markets within our own borders.

The economic advantage of foreign trade is very clear when we buy abroad things which we do not produce in the United States. Examples are coffee, bananas, cocoa, tea and raw rubber. To provide substitutes for these imports within our own country would entail a most uneconomical use of our resources. At the same time, we would lose the advantage of obtaining these imports in exchange for the products which we produce with greater efficiency than most other countries.

From this it can be seen that because of foreign trade our American consumers do enjoy a greater diversity of products, as well as a more bountiful supply of both farm and nonfarm products.

Consumers should also be interested in the tariff structure. High tariffs reduce the quantity of American exports. Because typical American agricultural and industrial exports are the products of some of the most efficient producers in the world, other countries are anxious to buy more from us. But their purchases in this country are limited by their dollar earnings. Increasing the effective demand for United States exports depends upon increasing the supply of dollars abroad. One important way of doing this is to increase our imports. Trade is a two-way proposition. The vast demand for American products abroad assures us that most dollars spent in foreign countries will come back here in one way or another in the form of increased orders for United States exports. Thus if we want to continue exporting sizable quantities of both farm and nonfarm products we must carefully review our tariff rates to see that they do not tend to block the free flow of goods from the United States.

Modern Milk Plant Flourishes in Nicaragua

By D. R. STROBEL

As the people in Caribbean and Central American countries develop a liking for milk, the United States' potential markets there increase for nonfat dry milk solids and anhydrous milk fat (butter oil)—the ingredients of recombined milk. The author, recently returned from a trip through Central America to survey the market for recombined milk, reports on a milk plant that is doing much to make milk popular in its own area.

In Managua, Nicaragua, is a cooperative milk plant that is an outstanding example of what can be done to improve the quality of local milk and to provide the people with a healthful, nutritious product.

In modern, sanitary quarters the Compañía Nacional de Productores de Leche, S.A., generally known as the Planta Pasteurizadora, every day bottles 40,000 quarts of pasteurized milk, including 2,400 quarts of chocolate milk. These it distributes in its own trucks to 150 refrigerated retail outlets for sale to Managua's population of more than 100,000. Retail price for the milk is 1.20 córdobas (about 17 cents) a quart; for the chocolate milk, 45 centavos (6 to 7 cents) a half-pint and 80 centavos (11 to 12 cents) a pint. The plant has difficulty keeping ahead of demand, for people drink a good deal of milk if they can get a product that is safe, has an agreeable taste, and is not too expensive to buy.

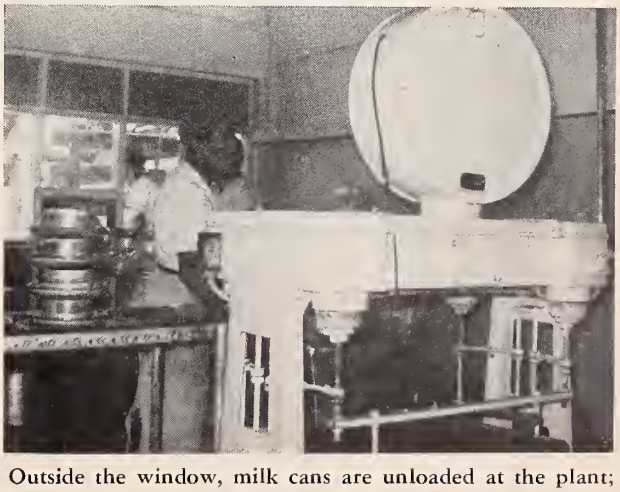
In my visit to the plant, I was interested chiefly in learning how this feat of establishing a safe, nutritious milk supply had been accomplished. I found that much of the credit goes to one man, Reinaldo Lacayo, the technical director, who is in charge of quality control.

He began where every efficient quality program must begin—with the raw milk as it comes from the farms. As soon as a farmer's milk shows quality deficiencies, his farm is visited and an official report of findings is filed with the Ministry of Public Health.

At least once every 2 weeks every producer's milk is subjected to several tests.

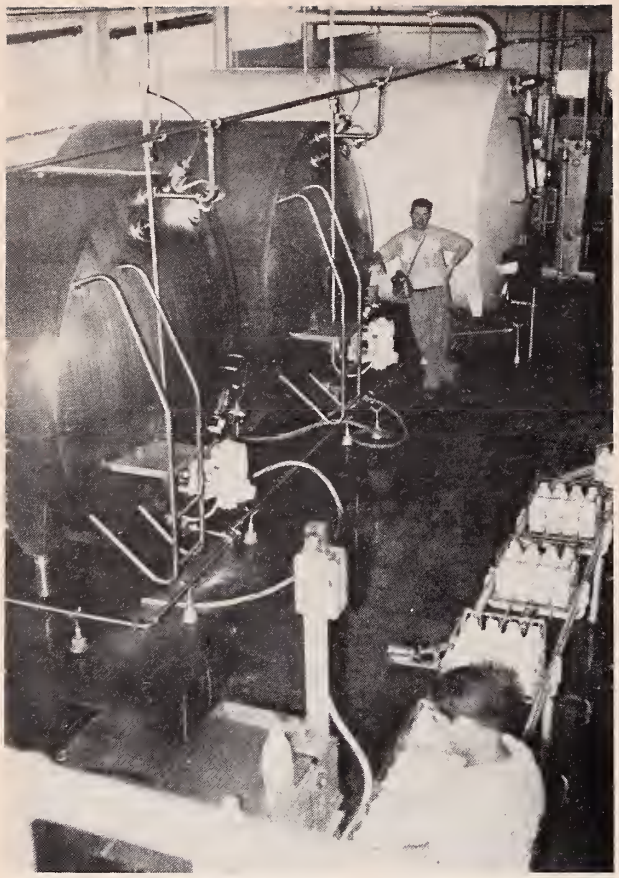
In the test for sediment, a pint sample is taken from the bottom of each can; and the findings show clearly just how careful the producer has been. Milk with excessive sediment of course is not accepted.

The new and the old join in bringing milk to the Managuan plant: at the left, a cart drawn by oxen; at the right, a truck.



Outside the window, milk cans are unloaded at the plant; inside, arriving milk is weighed.

Mr. Strobel is Marketing Specialist, Livestock and Livestock Products Division, FAS.

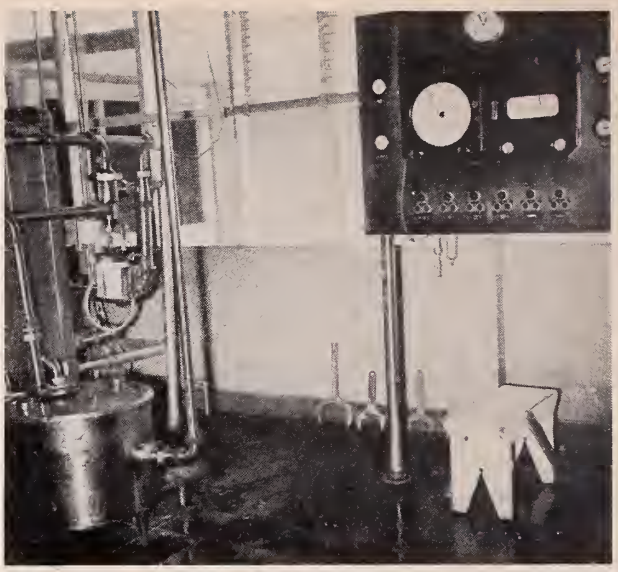


Into storage tanks in the processing room flows the milk.

Milk is refused also if in the periodic tests it shows excess acid. As an added precaution, each can of milk, as it is received, is checked for odor to detect sourness. To make this quality yardstick practical and enforceable, Mr. Lacayo has requested that the milk be brought to the plant promptly after each milking, morning and afternoon. Thus he has overcome the handicap of lack of refrigeration on the farms.

Other tests also are made, one for fat and one for specific gravity. A fat content of less than 3 percent disqualifies the milk, as does a low specific gravity, which indicates that the milk has been diluted.

To aid his producers in their job of delivering the best quality milk possible, Mr. Lacayo has purchased and sells practically at cost seamless 10-gallon milk cans, single-service pad strainers, pads, and cleaning materials. This in itself is an excellent beginning toward achieving a high-quality product.



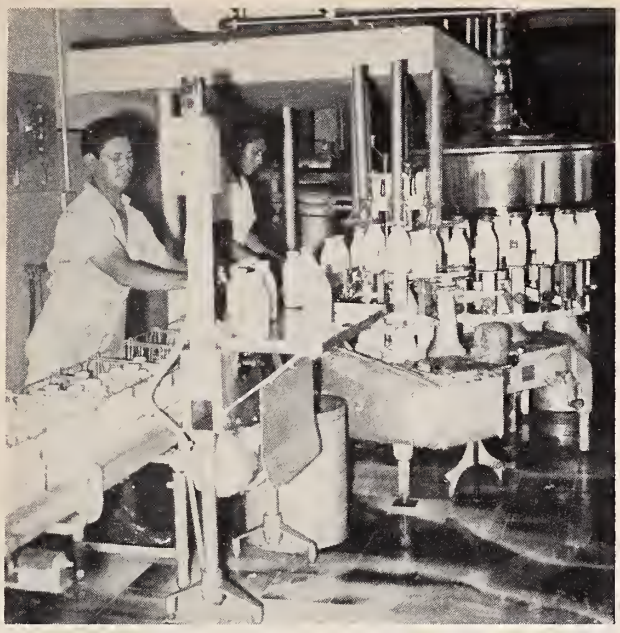
At the Managuan plant, milk is processed by the most modern equipment. Here is the high-temperature, short-time pasteurizer (left) and its control panel (right).

Realizing that the achievement of quality is a continuous process all the way from producer to consumer, Mr. Lacayo scrupulously continues his control system after the milk is received at the plant. The plant is equipped with modern stainless-steel processing equipment, properly sanitized and maintained. As the milk continues its journey from receiving tank to bottle, its quality is continually checked.

For instance, every hour samples are taken from the storage tanks and checked for acidity and flavor. Recording thermometers are used to record the temperature for every moment of the pasteurization process; and the phosphatase test is run to determine that adequate pasteurization has been done.

The plant has equipment for bacterial determinations on both raw and finished products. When these final laboratory controls go into operation, as they soon will, everything possible will have been done to guarantee the consumer a high-quality product.

A useful adjunct to the plant is its spray-drying equipment, which was acquired under a UNICEF (United Nations Children's Fund) program. With this equipment the plant can dry its surplus milk during the flush, or wet, season. As the contract with UNICEF provides, the nonfat milk powder is utilized in the school feeding program. The cream



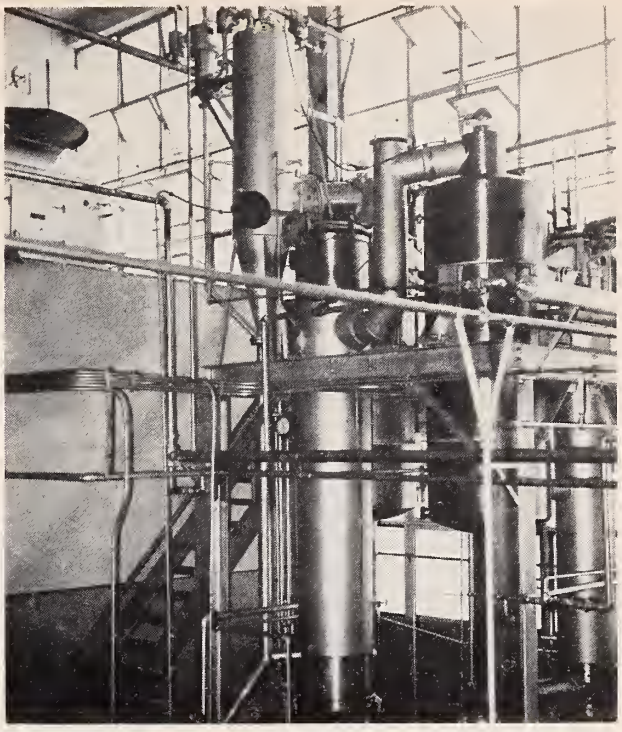
Milk is bottled mechanically, and the cases of full bottles move along a conveyor belt to the refrigerator.

is churned into butter. Powder that is over and above the school needs is now being utilized in chocolate drink and is added to the normal milk supply as a standardizing agent, thus augmenting the normal supply.

Soon, however, with consumption growing as it is and the short, or dry, season of supply approaching its peak, the plant will begin the recombining of imported nonfat milk powder and anhydrous milk fat (butter oil). Until local fluid milk production can be increased, it is essential that consumption be thus maintained during the short season. The recombined milk is as nutritious, wholesome, and flavorsome as the local milk supplied to the plant.

Among other plans for the development of the plant is one involving the manufacture of ice cream, which has already been approved.

Mr. Lacayo and his cooperative members are men of vision. Their success is reflected in the fact that new cooperatives are being organized and plants are being planned in the neighboring areas. The first new plant is to be built in León. It augurs well for the area's milk supply that the management of the new plants will have an efficient example to follow.



Milk-drying equipment was installed in the plant by UNICEF. The condensing unit is in the center; the drying unit, at the upper left.

Cases of bottled milk are delivered in the plant's own trucks to the various distribution points in the city.

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